

Client Meeting 1 Minutes

- Discussion of deliverables
 - Virtualization of 5 different control system scenarios
 - Lightweight, portable VMs
 - Devices
 - "leaf"
 - Relay
 - Should be real-time (how?)
 - PLC
 - 2nd level: Control-level device (like SEL RTAC)
 - 3rd level: Networking devices
 - Switches: just needed at the host level? (for multi-host machines)
 - Security device (firewall, gateway)
 - Start with one substation (about 10 relays, 1 gateway, etc.) for our demo
- Step 1: research existing virtual devices
 - How accurate are they to the real world?
 - What exists?
 - Next step? (finalize requirements and prep for design.)
- Display
 - Visualization would be nice.
- Hosting: internal GitLab instance
 - Probably open source release in the future
- No confidentiality issues with *our* part of the project
- Any (reasonable) programming language(s)
- Documentation requirements
 - Partially handled through
 - Docs for specific devices
- Basic stuff (beta) by about March would be good.
- No need for automated setup yet

Client Meeting 2 Minutes

- Next meeting: 26th or 1st
- Discussed existing virtual devices
 - Possibly add
- Continued goals
 - Find specs for controllers
 - SEL/Siemens would be good options.
 - May need to throttle controller performance to match "real hardware"
 - Focus is on the GUI interface.
- Preview goal (right before winter break)
 - Gateway
 - Network
 - No need to handle serial communication
 - Relay device with data model
 - Some kind of supervisor or control device
- Joseph: ask about previous virtualization project
- Getting data into relays
 - Opal RT?
 - Build sims directly into relays? (may be simpler...)
 - "Pluggable" data model (Shared library? Process & pipes?)
 - Could integrate with Opal too.
 - How does the relay respond to a trip?
 - Continued voltage measurements or just zeroes?
 - Ask Dr. Johnson.
- Arrange tour of a substation?
- Stretch goal: whole-system "monitor" interface

Client Meeting 3 Minutes

2017-11-01

- Moving from standalone servers to Amazon AWS instances
 - Make sure all team members have access.
 - Document the process of deploying a container.
- Virtual relay
 - Discussed progress
 - Values can be reported as integers (in volts, amps, and degrees)
- Control device
 - Reviewed existing (limited) design; should be sufficient for the prototype
- Licensing: whatever PNNL legal approves
- Design review
 - Probably November 15th at around 2:30 or 3:00PM.
 - Diagrams
 - Amazon integration stuff
 - Rough timeline
- Wiki
 - We'll try to get Pacific Project logo usage rights.

Instructor Meeting 1 Minutes

- Discussed current progress
 - Mostly blocked by limited client contact
- Showed system diagram

Meeting 1 Minutes

2017-09-11, 6:00PM

- Reviewed contract
- Initial client meeting: arranged (Joseph)
 - 3:00 on Thursday the 14th
 - Conference room reserved
 - Will discuss instructor meeting after; might be possible right after client mtg.
- JIRA (Dillon): license process started; should be ready soon
- Reviewed earlier discussions with client
 - Virtual devices and ModBus/DNP3 communication
 - Likely focused on C/C++
 - Some specs exist for virtual devices to build.
- Discussion of architecture
 - Likely based on Docker containers
- Made agenda for next client meeting

Assignments

- All: develop some high-level familiarity with ModBus, DNP3, and containerization

Future tasks

- Finalize last bits of contract

Meeting 2 Minutes

Monday, 2017-09-18, 6:00PM

- Revised contract for smaller team
- What are our goals right now?
 - Review existing simulation systems for relays and RTAC-like devices
- Discussed structure of Docker and how we would use it
- Discussed items for next client meetings

Assignments

- All: research virtual devices
- Gabe: relays
- Joseph
 - Contact PNNL about server access
 - Look into control machines
 - Schedule next client/instructor meeting
- Ben
 - Prep diagram of Docker structure
 - Set up GitLab/Jenkins
 - More research on OpenPLC

Meeting 3

Monday, 2017-09-25 6:00PM

Review

- Research results
 - Joseph: DNP3 information
 - Control systems: pretty standard Linux boxes
 - Any special programming language support?

Goals/tasks

- Build infrastructure prototype

Assignments

- Ben
 - Get PNNL server access
 - Set up infrastructure
 - Use gateway as a test case?
- Continue research (all)

Meeting 4 Minutes

2017-10-02

Review

- No word from client about server/meetings
- Found a relay datasheet

Discussion

- Reviewed upcoming deadlines

Assignments

- Ben
 - Update portfolio
 - Add data sheets I've found
 - Follow up on server again?
- Gabe
 - Look at RTAC data sheets
- Joseph
 - Confirm next client meeting

Meeting 5

2017-10-09

Review of goals/tasks

- Snapshot day
 - Assembled snapshot materials
- PNNL server
 - Still waiting

Design

- Discussed design of virtual relay program

Assignments

- Ben
 - Wait on server
 - Consider relay design further
- Joseph
 - Take snapshot poster to campus

Meeting 6

2017-10-16

Review of goals/tasks

- Snapshot: not bad, but next time:
 - More color
 - Bigger poster
- Reviewed design process for virtual relay

Design

- Discussed thread architecture of virtual relay
 - Do we really need a separate input simulation thread?
- Some discussion on future goals
 - Use WireShark to show Modbus communication? (if we don't have a viewer)

Assignments

- Joey & Gabe
 - Contact EE prof.
 - Ask client about server progress
- Ben
 - Work on input model and thread handling for virtual relay

Meeting 7

2017-10-23

Review of goals/tasks

- Reviewed existing relay code
 - Rename compile-time configuration namespace
- Walked through Debian VM setup

Design discussion

- Control device architecture
 - Dockerized Linux container
 - Probably a Python/Flask Web app for the user interface
 - OpenPLC for PLC functionality?
- Discussed plans for design review
 - Mostly making slides/diagrams

Assignments

- Ben
 - Clean up existing relay code
 - Expand doc comments
- All
 - Play with OpenPLC & Python Modbus bindings
 - Review existing relay code
 - Make plans for design review
- Joey
 - Follow up with client

Meeting 8

2017-10-30

Review of goals/tasks

- Wiki page started
- Next meeting scheduled
- State of relay code
 - Control logic and "input glue"

Design discussion

- GitLab CI instead of Jenkins
- Structure of relay code
 - Overall structure is OK.

Assignments

- Ben
 - Build out "input glue"
 - Expand docs and comments
 - Double-check invariants on `Connection.receive()`
- All
 - Control device Web server research
 - Python + Modbus + Flask

Meeting 9

2017-11-06

Review of goals/tasks

- Wiki page is up.
- Minor updates to virtual relay code
- Need a schedule
 - End of semester: virtual relay & basic control device
 - Relay still needs input & control logic
 - Next semester (about 3 weeks each)
 - PLC
 - Gateway
 - Multiple host machines
 - Polish & tooling (refine docs; make convenience scripts if necessary)

Design discussion: transitioning to AWS

- Played with ECS, but plain EC2 instances are probably a better option.
- Start using Alpine Linux for Docker image bases (instead of Debian)
 - Reduces image size so it's faster to push images
- Reviewed previous design (translates well to AWS)
- Virtual networking: use Docker container networks in swarm mode with DHCP/DNS
- We can prototype in our own individual AWS accounts to prevent billing issues.

Assignments

- Ben
 - More work on AWS setup
 - Initial setup script
 - Possibly refine virtual relay
- Gabe
 - Choose a Python Modbus library.
- Joey
 - Officially schedule design review
 - Start on design review slideshow
- All
 - Review wiki